reference, and claims the priority of Europ an Patent Application No. 99114604.4, fil d July 26, 1999, and the benefit of U.S. Provisional Application No. 60/145,838, filed July 27, 1999, the content of which is incorporated herein by reference.–

A1 Cont

IN THE CLAIMS:

Please cancel now pending claims 1-20 without prejudice or disclaimer and substitute new claims 21-41 therefor as follows:

WHAT IS CLAIMED IS:

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21. (New) A system for transporting electric energy in superconductivity conditions, comprising:

a superconducting cable including superconducting material, and

a cryogenic plant for cooling said superconducting cable below the critical temperature of said material, comprising:

a) a circuit for circulating from and to the superconducting cable a first refrigerating fluid having a first predetermined temperature lower than the critical temperature of the superconducting material,

b) a refrigerating circuit for cooling a second refrigerating fluid to a second predetermined temperature lower than the temperature of the first refrigerating fluid, and

c) a heat exchange unit for effecting a heat exchange between said first and second refrigerating fluids,

said heat exchange unit comprising a storage unit of a third refrigerating fluid having a third predetermined temperature lower than the temperatur

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of the first refrigerating fluid, said third refrigerating fluid b ing in heat exchange relationship with said first and second fluids.

22. (New) A system according to claim 21, wherein said storage unit has a predetermined volume adapted to contain a quantity of said third refrigerating fluid corresponding to the thermal consumption of said superconducting cable for at least two hours in the absence of a heat exchange with said second refrigerating fluid.

23. (New) A system according to claim 21, wherein the refrigerating circuit for cooling the second refrigerating fluid comprises at least one refrigerating unit provided with at least one heat exchanger in heat exchange relationship with said storage unit.

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24. (New) A system according to claim 21, wherein the refrigerating circuit for cooling the second refrigerating fluid comprises at least one refrigerating unit in heat exchange relationship with the storage unit and with said first fluid, said refrigerating unit being positioned upstream of said superconducting cable and the storage unit being in parallel with said refrigerating unit.

25. (New) A system according to claim 23 or 24, wherein said storage unit comprises a storage tank structurally independent from said refrigerating unit.

26. (New) A system according to claim 21, wherein the heat exchange unit further includes at least one heat exchanger immersed in the third refrigerating fluid stored in said storag unit, said at least on heat

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exchanger being provided with a fluid flowpath for th tub -sid circulation of said first refrig rating fluid.

27. (New) A system according to claim 21, further comprising an auxiliary circuit for maintaining the third refrigerating fluid at said predetermined temperature.

28. (New) A system according to claim 27, wherein the auxiliary circuit comprises at least one vacuum pump connected to said storage unit by means of ducts, at least one heat exchange unit being interposed between said vacuum pump and said heat exchange unit.

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29. (New) A system according to claim 28, wherein the heat exchange unit comprises at least one heat exchanger provided with a fluid flowpath for circulating a gas phase including vapors of said third refrigerating fluid.

30. (New) A system according to claim 21, further comprising a container for storing the third refrigerating fluid, said container being selectively connected to the storage unit of the heat exchange unit by means of at least one duct.

31. (New) A system according to claim 25, further comprising a container for storing the third refrigerating fluid, said container being selectively connected to the storage unit of the heat exchange unit by means of at least one duct.

32. (New) A system according to claim 21, wherein the first refrigerating fluid is liquid nitrogen, and said first predetermined temperature is between 63° and 70°K.

claim 11

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33. (New) A system according to claim 21, wherein said second refrigerating fluid is gaseous helium having a pressure ranging b tw en 1 and 20 bar, and said second predetermined temperature is between 40° and 50°K.

34. (New) A system according to claim 21, wherein said third refrigerating fluid is subcooled liquid nitrogen, and said third predetermined temperature is between 63° and 69°K.

35. (New) A cryogenic plant for cooling a superconducting cable including a superconducting material below the critical temperature of said superconducting material, comprising:

a) a circuit for circulating a first refrigerating fluid having a first predetermined temperature from and to the supercondcting cable,

b) a refrigerating circuit for cooling a second refrigerating fluid to a second predetermined temperature lower than the temperature of the first refrigerating fluid, and

c) a heat exchange unit for effecting a heat exchange between said first and second refrigerating fluids,

said heat exchange unit being provided with a storage unit of a third refrigerating fluid having a third predetermined temperature lower than the temperature of the first refrigerating fluid, said third refrigerating fluid being in heat exchange relationship with said first and second fluids.

36. (New) A cryogenic plant according to claim 35, wherein said storage unit has a predetermined volume adapted to contain a quantity of said third refrigerating fluid at said predetermin d temperatur , corr sponding to the

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thermal workload of said refrigerating circuit for a time period of at least two hours in the absence of heat exchange with said second fluid.

37. (New) A cryogenic plant according to claim 36, wherein said storage unit has a volume corresponding to the thermal workload of said refrigerating circuit for a time period of at least twelve hours in the absence of heat exchange with said second fluid.

38. (New) A cryogenic plant according to claim 35, wherein said storage unit has a volume of at least 2000 liters.

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39. (New) A cryogenic plant according to claim 25, wherein said storage unit has a volume of at least 12000 liters.

40. (New) A method for continuously cooling a superconducting cable including a superconducting material below the critical temperature of said superconducting material, comprising the steps of:

a) circulating a first refrigerating fluid from and to the superconducting cable;

b) cooling the first refrigerating fluid to a first predetermined temperature by means of a second refrigerating fluid having a second predetermined temperature lower than the temperature of the first refrigerating fluid;

the cooling step of the first refrigerating fluid being effected by means of the further steps of:

c) providing a cryogenic bath of a third refrigerating fluid in a storage area;

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